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~~GENERAL~~ COASTAL PLAIN EXPERIMENT

BENEFITS OF IMPROVED ROADS.

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BENEFITS OF IMPROVED ROADS.

INTRODUCTION.

The various benefits of good roads may be grouped under two main subdivisions, dealing, respectively, with economic benefits and social benefits. There is at present no unique or final measure of either the economic or the social benefits accruing to a community by the establishment of good public roads. So intimately are the public highways connected with every aspect of community life that almost any method devised to measure the benefits of good roads is incomplete.

It is apparent, however, to anyone who has studied road matters for a period of years that the advantages of improved public roads have been repeatedly proved beyond all argument. There is no case on record where any community has ever regretted the improvement of its roads. It is doubtless true, however, that it is easy for good-roads advocates to underestimate the difficulties of bringing about a reform in the condition of roads.

When the various ways in which good roads benefit a community are examined, a complex situation is found in which many actions and reactions take place. When good roads reduce the cost of hauling, adjacent land becomes more valuable; there is a corresponding tendency of population to increase, and, in its turn, this tendency strengthens the demand for more good roads; social conditions improve; and the life of the community is influenced in numerous ways. It is not always correct to say that good roads are the primary cause of increase in property valuation. It is, however, proper to conclude that improved roads and an increased property valuation are inseparable. Doubtless the pressure of population around New York City has increased property valuation, and it may have created the demand for improved highways, but it is equally certain that in many instances improved road conditions have preceded and caused an increase in land valuations and a growth of population.

ECONOMIC ADVANTAGES.

DECREASE IN THE COST OF HAULING.

There are certain direct economic or money advantages which follow the improvement of public roads in every community. These advantages are probably most apparent in the reduced cost of haul-

ing. Certain dependent or reflex economic advantages also arise in a community where roads have been improved. The increase in the value of farm lands is an example of the indirect economic advantage of improved road conditions. It should not be considered, however, that, in presenting the advantages of improved roads, the direct decrease in the cost of hauling and the increase in farm values are entirely separate and independent. The farm increases in value partly because the cost of hauling is decreased.

Whatever methods are used to improve a road, the improvement for hauling purposes is due to three causes—the betterment of the road surface, the reduction of the grade, and the shortening of the length. On such an improved road the time required to haul a given quantity of material a given distance is reduced. The reduction may be largely due to increased speed of hauling, to increased load, or to both. It is important to recognize that for transportation purposes reduction of time is equivalent to a decrease of the distance from the market centers. It is easy to see, then, why the increase of farm values must follow improved roads, for their effect is to bring the farms, in a sense, nearer the towns. The fact that on roads with improved surfaces hauling becomes largely independent of the season of the year or weather conditions means another very considerable reduction in hauling costs. It also means that many of the limitations of the number and kind of farm operations are immediately removed.

In order to fix one's ideas on the reduction in the cost of hauling due to the improvement of roads, the transportation of goods to the railroads and of farm produce to market should be considered. The cost of this work in the United States at present is high and is due mainly to steep grades and yielding road surfaces on unimproved roads. When a grade exceeds a rise of 6 feet to the hundred feet in horizontal measure it becomes an increasing hindrance to traffic. On any grade, in addition to the tractive force due to the surface conditions, the force of gravity must be overcome. The horse must also raise his own weight and, because of the manner in which his strength is applied, it becomes less and less available as the grade increases. It must always be remembered that the worst grade on any road tends to limit the load that can pass over the *entire* road. For example, if a 1,200-pound horse, by exerting a force equal to one-tenth of his weight, can draw a load of about 2,000 pounds on a level earth road, with the same force exerted against the collar he can draw continuously only about 1,000 pounds on a 5 per cent grade and only about 750 pounds on a 10 per cent grade. Consequently the load is limited over the entire road on which the grade exists, even though for short pulls the effort of a horse may more than double.

While steep grades are detrimental on common earth roads, they are far more so on an improved road. If it is assumed that a 1,200-pound horse, by exerting a certain effort, can draw a load of 2,000 pounds on a level earth road, under the same conditions this horse can draw continuously a load of 5,000 pounds on a level macadam road in average condition, but on a 5 per cent grade it can draw only 1,600 pounds, while on a 10 per cent grade the load would have to be reduced to 960 pounds. Thus, while the load which can be hauled on a level macadam road is more than double that on the level earth road, the load on a 10 per cent grade is only 210 pounds greater on the macadam than on the earth road. It is because the tractive resistance on a macadam surface is low that the grade effect quickly exceeds that resistance.

It becomes immediately apparent, therefore, that, when a road is to be improved by macadamizing it, the maximum grade allowed must be low in order to secure the full advantage of the hardened surface. Steep grades are also slippery and therefore dangerous in winter, and the maintenance charges are always high. In fact, the better and harder the road surface the more imperative it becomes to secure easy grades.

The conspicuous fact in connection with excessive grades is that they are usually unnecessary. Steep grades have come about largely from the desire to lay out roads in straight lines and along farm boundaries. The gain in distance in passing over a hill instead of around it is very slight. As a matter of fact, many roads have been relocated around hills with no addition to the length in some instances and with the addition of only a few feet in others. The length of a road passing over a hill is, of course, somewhat greater than the length of a horizontal road joining the same two points in a straight line. When the road is relocated on an easy grade around a hill, the length of the horizontal curve is seldom greatly in excess of the length on the original vertical curve. A rigorous discussion to fix in figures the advantages of reduced grades is not possible without extensive data obtained directly from the road itself. Nevertheless, there has never been on record a case where a properly relocated road has afforded any dispute as to the question of its material reduction of the hauling cost. The examples which are on record, to set forth in a descriptive way the advantages of a reduced grade on relocated roads in many parts of the country, are numerous and conclusive.

The shortening of a road is, of course, a most direct method of reducing hauling costs. It is brought about either by relocating portions of old roads or by building new and shorter roads. Such work

of relocation to shorten roads is usually accompanied by a reduction of the grades and the improvement of the surface, but it is unnecessary to make a separate discussion of the obvious economic advantage of shortening the road.

The cost of hauling farm produce to market is probably not so much increased by the presence of excessive grades as it is by the bad conditions of road surfaces. The desirable road surface is hard and reasonably smooth. Almost every road is fairly hard at certain times in the year. Too frequently, however, at the season when it is desired to use the roads, the surface is soft, and the consequent tractive resistance is excessive and wasteful. The most frequent form of soft road surface is the muddy surface. Many attempts have been made to fix the relative weights which a horse can draw in an ordinary wagon over level road surfaces of various kinds, and the following figures are current and fairly reliable: On a muddy earth road the amount varies from nothing to a maximum of 800 pounds; on a smooth, dry earth road, from 1,000 to 2,000 pounds; on a gravel road in bad condition, from 1,000 to 1,500 pounds; on a gravel road in good condition, about 3,300 pounds; on a macadam road, from 2,000 to 5,000 pounds; and on a brick road, from 5,000 to 8,000 pounds. These figures show that if the speed of travel is the same on all these road surfaces a horse will haul on a good macadam road from three to five times as many tons per mile in a day as upon a moderately muddy earth road. This matter may be considered in another way by admitting that one horse is capable of a certain fixed duty per day. Then, with a given load, the effective radius of travel from a given point on a macadam road is from three to five times the radius of travel from that point on a moderately muddy earth road. The trouble with unimproved earth roads is that they are moderately muddy for many months in the year.

There is no question that poor road surfaces cause an economic waste, of which the total in this country is startling. In 1906 the Bureau of Statistics of the Department of Agriculture deduced an average cost per ton-mile of 22.7 cents, based upon replies from inquiries sent to about 2,800 county correspondents. The average haul reported was 9.4 miles. Since, at this time, less than 8 per cent of the roads in this country were improved, these figures indicate the average cost of hauling on unimproved roads.

Postponing further discussion of total saving which could be effected by improved roads in this country, it is well to consider a few authentic instances of actual conditions. A farmer in Sullivan County, Tenn., in 1908, had to haul barbed wire from Bristol to Kingsport, a distance of 23 miles. He found that with a two-horse team his maximum load was 500 pounds and that three days were

necessary to make one round trip. To haul one ton, therefore, required 12 days and, at \$3 a day for the man and team, the cost was



FIG. 1.—A road in Sullivan County, Tenn., before improvement.

\$36. This was before Sullivan County issued bonds for road improvement. Under the bond issue, the road from Bristol to Kings-



FIG. 2.—A road in Sullivan County, Tenn., after improvement (same road as in FIG. 1).

port was improved, so that the same team can now readily draw a ton to the load and make one round trip in two days at a cost of \$6.

The ton-mile cost under the old conditions was \$1.56, and this cost was reduced to 26 cents by the improved road. Figure 1 shows a view of this road before it was improved, and figure 2 another view after improvement.

Another instance, at Crosby, Tex., is significant. There a shell road was built for 1 mile out of town. A farmer 4 miles out came to town with a team of two mules and loaded on his wagon at the railroad station 2 tons of wire fencing. At the end of the improved shell road, on his return, the farmer was compelled to throw off 3,000 pounds of wire. He then hitched two additional mules to haul 1,000 pounds on the remaining 3 miles of unimproved road. This man then had to make three more trips for the remaining 3,000 pounds of wire, and it required his time for the 4 miles from 10 o'clock one

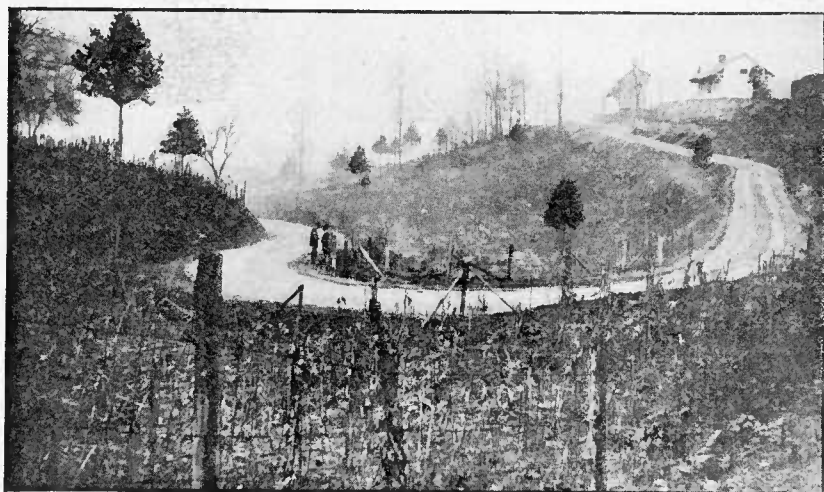


FIG. 3.—Road from Ben Hur to Jonesville, Va., after improvement.

morning until 11 o'clock the next morning to finish the hauling. If the improved road had extended 4 miles to the farm, the original team of two mules could have hauled the 2 tons of wire in $2\frac{1}{2}$ hours.

Figure 3 shows the improved road from Ben Hur to Jonesville, in Lee County, Va. Before this road was improved, merchants hauling goods in 1908 from Ben Hur, the nearest railroad station to Jonesville, required a two-horse team for 2,500 pounds, when the roads were in ordinary condition. Since the road has been improved, these merchants haul 30 sacks of fertilizer, which weigh 200 pounds each, and use two mules. They now make two trips a day instead of one. They can haul 80 bushels of coal to the load instead of from 30 to 35, which was the load on the unimproved road.

The distance between Dandridge and Jefferson City, in Jefferson County, Tenn., is 10 miles. Before the county issued bonds, this road was so bad that 20 bushels of wheat made a good load for a two-horse

team at almost any time of the year, and a day was required to make the round trip. Dandridge is the county seat and Jefferson City is the nearest railroad station. A few years ago the county issued bonds and improved this road by relocating and surfacing it with macadam. At the present time 50 bushels of wheat can be hauled over it with a two-horse team and a round trip made in less than a day. It formerly cost 15 cents a bushel to deliver wheat at the depot, or 50 cents per ton-mile, while on the new road it costs 4 cents per bushel or about 13 cents per ton-mile—about one-quarter of the former hauling cost. These figures are based on a charge of \$3 a day for man and team.

There has never been a comprehensive traffic census taken in the United States. In fact, there has never been any State-wide traffic census except in Illinois, Massachusetts, and New York. It will be extremely difficult to establish nation-wide hauling costs until more rigorous checks have been developed for handling the statistical data. Even in France, which has been considered the model for the world in road matters, the traffic upon the 250,000 miles of smaller roads is still unknown. It is probable that a subdivision of our own country into several traffic zones will be helpful. Such relations as the intensity of traffic to average lengths of haul and variations in team prices can then be better controlled.

In the cotton States of the South¹ the average haul of cotton from the farm to the shipping point is 11.8 miles. The average load is about 1,700 pounds—a little more than 3 bales—and the average cost is 80 cents per bale. The cost of marketing the 1911 crop of 16,250,276 bales was \$13,000,220, if computed on the above basis. To each bale of cotton there is about one-half a ton of cotton seed, which was hauled from the farm to the gin, and then a large percentage of it hauled again to the shipping point. The average cost of hauling cotton seed in the United States¹ is \$3 a ton. The 1911 crop of seed, therefore, cost \$24,375,414 to haul. The total cost of hauling the cotton crop in 1911, including the seed, was, therefore, \$37,375,634. Any system of road improvement throughout this zone which would reduce the annual hauling charge 5 per cent would effect a saving of \$1,868,781 a year. From these figures it would appear that it would be good business to incur an expense for road improvement, even if such investment entailed an annual interest and maintenance charge of \$1,000,000 to the community of cotton States. In figures 4 and 5 are presented conditions of hauling before and after road improvement was made in Madison County, Tenn. In both pictures the teams are hauling cotton. Before the roads were improved 1 bale of cotton was a load for a two-horse team on some of the roads. There are now 192 miles of improved roads in

¹ Bulletin No. 49, Bureau of Statistics, Department of Agriculture.

Madison County, and 10 bales is not an uncommon load for two horses.

It is highly desirable that the road officials in any locality should have information which will enable them to establish, in some measure, the money value of any proposed system of road improvement. It is becoming increasingly evident, however, that it is undesirable for a locality to base its calculations upon generalized data deduced from nation-wide observations. What is needed in the individual instance is an understanding of the methods which must be employed to establish the economic conditions in the locality. Certain facts which are essential are easily obtained. The area of the road district or other highway unit, the number of miles of roads of various classes and



FIG. 4.—Hauling cotton in Madison County, Tenn., before improving the roads.

their distribution, the more important crops, the number of miles of railroad and the number of railroad stations, and similar data may be accurately established. So also may the prevailing cost of teams with driver for a 10-hour day. The average load and the average haul are less easily obtained, but they are essential in developing facts. When all the information has been carefully studied it will be possible to derive ton-mile cost for the various classes of commodities hauled. If the areas along the roads devoted to various crops and the acreage yield in tons can be compiled, it will be of great value in determining the annual service of the road.

A traffic census should be made and the total hauling charges for the community approximately estimated. From a strictly business

standpoint it then becomes necessary to make a conservative estimate of the reduction in hauling costs that will result from any system of road improvement. The important point is that at least a part of the reduction in the total annual hauling charges to the community must be regarded as measuring the interest and maintenance charges which the community can economically afford for an investment in improved roads. The amount of money available for improvement can not by this method be measured by one calculation; one or two calculations will be needed before any considerable bond issue or any form of raising money is decided upon.

As an illustration, the example of a county in which wheat is the prevailing crop may be considered. If the construction of narrow



FIG. 5.—Hauling cotton in Madison County, Tenn., after improving the roads.

single-track roads with improved surface will reduce the hauling cost 5 cents a ton-mile and the average yield of wheat is 30 bushels to the acre, there results, for an average haul of 5 miles, an economic advantage of 22.5 cents per acre or \$36 per quarter section. This is 4 per cent on \$900. It appears immediately that such a community will be safe in borrowing money to the extent of \$2,000 per square mile of wheat area to effect such an improvement in the roads as would reduce the hauling charges 5 cents per ton-mile on the wheat crop alone.

In determining the economic advantages of good roads to any community there are three items which must be included, but for which no specific figures can be given. These items are the wear and tear on vehicles and harness, the interest charges on the investment in extra horses, and the wear and tear on the horses.

The argument for the reduced cost of hauling on country roads need not be carried further. In moving products of all kinds from the field to the consumer it is clear that the reduction in transportation charges is most imperative on the country road. During the past 15 years remarkable changes in highway transportation have been brought about by the introduction of motor-driven vehicles. The motor car was first regarded as an exclusive luxury, but it has become, to an increasing extent, an economic necessity. It is impossible, at the present time, to place an upper limit upon the use of the motor vehicle for any purpose. It is the most potent single influence that has reached the road problem since McAdam. The adaptability of the automobile and motor truck is almost unlimited, and the farmers, especially those of the West and Middle West, have been quick to recognize it. In handling milk and cream the motor truck has become especially useful and has extended land areas available for profitable dairying.

While no great stress has been laid upon the total annual waste on account of poor roads, figures have been presented which are sufficiently indicative to those who are interested in road matters from a nation-wide standpoint. In this connection it is well to remember that the economic problem of to-day is not so much a problem of production as it is a problem of distribution. In the process of distribution it is not too much to say that the highway is the first link, but that it is operating at present with the lowest efficiency.

RELATION OF ROADS TO AGRICULTURAL CONDITIONS.

This section is to discuss certain questions of farm economics, without, however, introducing the social conditions of country life. The business of farming is essentially dependent on the condition of country roads, for whatever is not produced on the farm must be hauled to the farm, and many crops of the farm must be hauled away to the railroad stations and local markets.

Farmers sooner or later come to realize the desirability of diversified farming. Perhaps no cause limits farming of this description as effectively as bad roads. Of course, the prime requisite for successful diversified farming is a good market. This market may be either a near-by town or a city, or a distant market which requires railroad transportation. In any case, however, the speed of transportation from farm to the unloading point is essential. Diversified farming usually means a change from staple crops such as corn and wheat to more perishable products such as fruits and garden truck; that is to say, from crops that may be held at the farm to crops which must be moved away from the farm immediately. The possibility of this change is largely dependent upon road conditions.

A farmer 10 miles from a market for spring truck crops, such as rhubarb, peas, and spinach, is at a great disadvantage if his market

road is unimproved, and he may be totally unable to compete with the farmer the same distance from market in another direction on a good road.

About each market or shipping point there is a boundary line which incloses the area that can be cultivated profitably for delivery at that point. If this area is considered as bounded by a circle, it is not difficult to see that its size will depend upon road conditions. The profit to the farmer is determined by the difference between the production and transportation costs and the selling prices. Production must cease when the transportation costs wipe out the difference. As one goes farther from market centers, he passes through successive zones of production, each of which contains fewer farm products, because some products will not bear the additional cost of transportation. With a good system of improved roads radiating from market centers, it must follow, if all other things are equal, that the total area of farming land will increase, as well as the successive areas or zones capable of supporting diversified crops. The whole business of farming is sufficiently dependent upon weather conditions without the added uncertainty of road conditions.

It is a well established fact that market prices for even staple crops vary considerably throughout the year. Where bad roads prevail, farmers are forced to move their crops, not when the market price is favorable, but when the roads are favorable. It is common for the farmer to find that he can not haul his produce to market when prices are highest, because the roads are impassable. When the roads become passable, the time for market has largely passed and produce is compelled to move in masses which frequently glut the market and break the prices. Excessive fluctuations in market prices are seldom due to overproduction. They frequently take place in regions where the local production does not equal the annual consumption. There are counties rich in agricultural possibilities, burdened with bad roads, where the annual incoming shipments of food-stuffs exceed the outgoing shipments in the ratio of four to one. Many such counties with improved roads could not only become self-supporting, but could ship products to other markets. A farmer in Sullivan County, Tenn., a few miles from Bristol, had 100 bushels of Irish potatoes which he intended to market during the winter of 1907-8. Owing to bad roads he was unable to haul the potatoes at all and they rotted in the cellar. Nevertheless, the price of potatoes at Bristol went as high as \$1.40 per bushel in the meantime. A Bristol merchant stated that during the winter as many as 10 carloads of farm produce, including wheat, potatoes, and other supplies, were daily shipped in to feed not only Bristol, but the adjacent territory.

The question of opportunity in marketing is worthy of consideration. For the sake of example, let it be supposed that two farmers living in separate counties, but at equal distances from the cotton market, learn by telephone that cotton has advanced in price \$1 per bale. The farmer living on a bad road can immediately haul one bale of cotton, while the other farmer can haul four bales because he lives on a good road. The rise in price means a profit of \$4 to the one man and only \$1 to his neighbor. That this condition may actually arise is evident from figure 6, showing two farmers living near Florence, Ala., arriving at market with cotton.

When the roads of this country or of the great producing zones of this country become improved, it is reasonable to suppose that periodical congestion of markets will tend to disappear. Corre-



FIG. 6.—Bad roads *v.* good roads, Florence, Ala.

sponding benefits will accrue not only to the producer, but to the consumer. When marketing is distributed throughout the year, storage charges must decline. This country is paying at present large storage prices on foodstuffs. In Chicago the storage charges on grain amount to $12\frac{1}{2}$ cents a bushel per year. The disadvantages of freight congestion in the fall can not be entirely eliminated in many places, but good roads will certainly have a marked tendency to distribute hauling over longer periods.

It is reasonable to say, therefore, that good roads mean that diversified farming will be encouraged, the area of profitable production increased, the opportunity for favorable marketing improved, and more uniform distribution of farm products secured, and, as a consequence, speculation in staple products will be reduced.

INCREASE IN THE VALUE OF FARM LANDS.

It is a matter of common observation that, when any community has passed from a condition dominated by bad roads to a condition which is characterized by good roads, land values in that community advance. It is plain that no system of good roads can directly improve the soil fertility or the quality of farms. It is equally true that good roads can and do directly improve the site value, or the value which accrues to a farm by virtue of its situation with respect to markets, schools, and towns. In dealing with this matter of increased farm values from a strictly economic standpoint, it has been previously pointed out and it is worth remembering, that where farms have advanced in value the advance is due essentially to decreased hauling costs. The advance in farm values, in other words, measures partly the increased value of the farm as a plant for the business of farming. That increment of value which is due to those things that are described as social advantages or improved social conditions has no numerical measure. When his road is improved the landowner appreciates the improvement and frequently sets an increased value upon his land. It is difficult, however, to analyze the entire increment of value which follows good roads. There is no doubt that the cost of good roads is met by some form of taxation, which, in many instances, causes the landowners to add to the selling price of their land that amount which they estimate the good road has cost them in taxes. This process is more distinctly observed in city property transfers, where direct assessments for sewers, sidewalks, and pavements are invariably added to the original cost of the property. The important point that is becoming more and more understood by landowners is that good roads require a considerable investment of capital, and furthermore that such an investment is a paying one. Here are a few instances of actual conditions which have been observed in various parts of the country.

In Lee County, Va., a farmer owned 100 acres between Ben Hur and Jonesville, which he offered to sell for \$1,800. In 1908 this road was improved, and although the farmer fought the improvement he has since refused \$3,000 for his farm. Along this same road a tract of 188 acres was supposed to have been sold for \$6,000. The purchaser refused the contract, however, and the owner threatened to sue him. After the road improvement, and without any improvements upon the land, the same farm was sold to the original purchaser for \$9,000.

In Jackson County, Ala., the people voted a bond issue of \$250,000 for road improvement and improved 24 per cent of the roads. The census of 1900 gives the value of all farm lands in Jackson County as \$4.90 per acre. The selling value at that time was from \$6 to \$15 per acre. The census of 1910 places the value of all farm lands in

Jackson County at \$9.79 per acre, and the selling price is now from \$15 to \$25 per acre.

The price of farm land, like that of any other commodity, is ruled by the relation between supply and demand. When the price of farm lands advances it measures a readjustment between the supply and the demand. This readjustment, as has been seen, is sharp and immediate in many cases. One distinct item of increased values is becoming more evident from year to year; that is, immigration into the rural districts where road conditions are favorable. In this respect the presence of good roads has its greatest influence upon the owners of automobiles. There are repeated instances of this kind in New England and those States which have been active in improving their roads by State aid.

INCREASE OF TOURIST TRAVEL.

The roads of this country are being used each year to a larger extent by the automobile. The increase in the number of automobiles manufactured in this country is exhibited by the following table:

TABLE NO. 1.—*Number of automobiles manufactured in the United States from 1899-1912, inclusive.*

Date.	Number of Automobiles.
1899.....	13,723
1904.....	122,830
1909.....	1127,287
1910.....	¹ 186,000
1911.....	² 209,652
1912.....	³ 245,000

¹ U. S. Census, 1910.

² From "The Automobile," Jan. 4, 1912.

³ Estimated.

In addition to the attractions of the short tour and the country summer residence for the automobilist in this country, there exists a large number of more remote attractions comparable to those of Europe. Each year it is estimated that no less than 3,000,000 tourists visit Switzerland, and a large number of these are American citizens. The little country of Switzerland depends upon the expenditures of tourists for a large amount of its revenue. It is found profitable to build and maintain improved roads of the highest type to hold this business in Switzerland. There are in this country types of scenery and points of interest which compare most favorably with those of Europe, and of late years improved roads have been constructed in the vicinity of some of these places. A type of American scenery is shown in figure 7. It is probable that during the year 1912, 500 cars will make a tour across the entire continent and will distribute at least \$1,000,000 on this trip. Figures from the Denver Chamber of

Commerce show that 6,000 automobilists visiting Colorado spent more than \$2,700,000 in that State alone.

Much has been done already by motorists to secure the improvement of the public highways. Probably nothing has contributed more to existing favorable sentiment for good roads than the agitation by automobile owners. These men have been active in making addresses and distributing literature throughout the country. They have attended public gatherings and have perfected organizations for calling people together and securing the attendance of good speakers on road subjects. They are to-day supporting a number of magazines which are doing a great work in keeping alive the sentiment for better roads. Perhaps, however, the most beneficial of all the work of the motorists has been the road pioneering work which



FIG. 7.—An improved road in Cumberland Gap, Tenn.

has been undertaken in the long tours over this country and into Canada. In certain instances, as a result of such tours, roads which have been practically impassable have been put into first-class condition. Sometimes the results of the tours have not been immediate, but the way has been blazed for future development.

In counties where there are towns of considerable size the automobilists have made tour after tour over the main highways in the vicinity and have urged their improvement. Motorists subscribe liberally to the improvement of certain highways, and their money has constituted a nucleus which invites further contributions by individuals and local authorities. In some cases automobile owners have contributed personal services. At a recent meeting of the Idaho State Automobile Association at Pocatello, it is reported that a com-

mittee adopted a plan for completing the Ross-Ford Road by popular subscription amounting to \$15,000.

When, therefore, one considers all the various ways in which tourist travel operates to benefit those communities which are reached by country roads, it is obvious that, in reckoning the benefits of improved roads, the possibility of increased tourist travel must be included as an economic factor.

SOCIAL ADVANTAGES.

IMPROVEMENT OF SCHOOLS.

The question of better rural schools is to-day an important one in the public mind. The rural population is apparently more willing at present to support better schools than at any previous time. The place of the one-room school is being taken by larger consolidated schools throughout those portions of the country where conditions make it practicable to convey children to school at public expense. Bad road conditions inflict twofold hardships on the one-room district school. In the first place, where it is situated on a poor road, it is a common practice in severe weather to keep the school children at home. The frequent small attendance is thus, at times, almost entirely depleted, and the continuity and value of school work are much impaired. The presence of poor roads probably often prevents an economic consolidation of these smaller schools into a large, strong, graded school with high-school courses, superintended by a competent principal and body of teachers.

It should be pointed out that there is a marked tendency for the consolidated school to become the social and intellectual center of the community. Most of these modern rural schoolhouses are now so constructed that they serve the community as gathering places for public meetings of various kinds. The school wagons are frequently pressed into service to haul farmers and farmers' wives to grange meetings, lectures, musicals, entertainments, short courses or institute work at the school. With this fact becoming more and more recognized, the importance of the consolidated school as a community center is increasing. In order that the people may receive the full benefit of their schools, the buildings must be readily accessible throughout the year.

IMPROVEMENT OF THE RURAL DELIVERY SERVICE.

The beneficial effects of the rural free delivery service upon the happiness and home comforts of our rural population have become established facts, and nothing contributes so much to its efficiency and regularity as good roads. The Fourth Assistant Postmaster General, in his report for the year ending June 30, 1909, writes:

Essential factors in the value of rural delivery as a postal facility are speed and regularity, and the attainment of a satisfactory standard in these particulars is absolutely dependent on improved roads.

The total mileage of rural routes in operation on April 1, 1912, was 1,018,909, and the daily travel by the carriers was 1,010,396 miles, which is nearly one-half of the total road mileage in the country to-day. There were 42,100 delivery routes, with an average length of about 24 miles each. The cost per mile traveled by the carrier could be greatly reduced and the length of many of the routes could be increased, if the roads were generally improved. In many instances the Post Office Department has found it necessary to discon-



FIG 8.—A rural delivery route in Mississippi.

tinue rural routes because of the impassable condition of the roads. Figure 8 shows a rural delivery route in Mississippi on which the mail was carried on horseback for a time because of the terrible mud roads. On the other hand, the cost of delivering the mail is reduced to a minimum in Chattooga County, Ga., by the use of motor cycles.

IMPROVEMENT OF SOCIAL CONDITIONS.

The social conditions of rural communities are matters of serious consideration. If the term "social condition" is analyzed, it will be found that all social activity is dependent upon the gathering of people for some common purpose. It is not difficult, therefore, to

see the connection between desirable social conditions and the improvement of public roads. Social institutions, such as schools, churches, and public amusements are more or less subject to valuation in any community, but they are by no means the complete measure of social conditions in that community. Those subtle and delicately adjusted relations which obtain in any neighborhood are equally dependent in the country upon road conditions. It is necessary to mention these intangible things if one is to have the breadth of view to understand the influences which make for the final status of country life. Bad roads are often a handicap to social intercourse. Under the worst road conditions all travel may be completely suspended. It is not difficult to see such conditions, but what is more difficult is to comprehend the general improved social atmosphere which adequately improved road conditions cause in rural communities.

The esthetic value of roads well built and clean is sometimes reluctantly conceded or even denied by individuals. It is noticeable, however, that along improved roads there is a visible tendency for farmers to improve the appearance of their homes and their out-buildings. In fact, the presence of good roads seems, many times, to stimulate latent self-respect into practical expression. There is no wonder that a bog of well-nigh impassable mud before one's door should react unfavorably upon the entire family. The improved road not only has an esthetic value in itself, but it is potent in awakening the dwellers along its borders to a sense of esthetic values in farm buildings and home surroundings.

Social activities in rural communities need all the encouragement and stimulus that can reasonably be given. All social activities take time and energy, and the country-road condition therefore is a prime consideration to enable farmers and their families to afford time for social intercourse. The unnecessary subdivision of the church into numerous small buildings throughout many portions of the country has necessarily operated to weaken the attendance, but the concentration of church funds and church attendance is dependent upon improved road conditions.

The drift of the country population to the city is certainly to be deplored, and a way to explain this drift is often sought. It is not clearly established that good roads alone can turn the tide of cityward movement, but it is clearly established that in seeking reasons for the movement the student of social economics must be very patient in setting values upon many things which are not reducible to the common denominator of the dollar, but which have been repeatedly shown to be effective causes in depleting country population.